WeaCoDi: A Universal Diagram for Visual Representation of Weather Conditions

Abstract

WeaCoDi (Weather Comfort Diagram) is a universal method for visualizing weather forecasts, providing an intuitive representation of climatic conditions. Unlike traditional text-based, graphical, and tabular forecast formats, WeaCoDi employs a multi-layered diagram that allows users to easily perceive key meteorological parameters. The flexibility of this method enables adaptation to various requirements, displaying both general weather conditions and specialized data in the form of graphs overlaid on the base diagram.

WeaCoDi serves as an effective **Human-Computer Interface**, simplifying weather forecast perception and allowing users to quickly assess meteorological conditions without analyzing complex numerical data.

Introduction

Traditional methods of presenting weather forecasts (tables, icons, graphs, text) often require careful examination and analysis, making them less convenient for quick perception. WeaCoDi offers an alternative data representation method focused on **visual perception**.

A key feature of this method is the use of **layered meteorological data representation**, making the diagram **intuitive and easy to interpret**. Numerical values are either absent or optional, while displayed data remain **relative and approximate**.

This method provides **flexible diagram customization** for specific tasks, ensuring clarity without excessive information overload.

Methodology

1. Layered Data Representation

WeaCoDi is based on the principle of **graphical stratification** (layered parameter overlay), where:

- **The background of the diagram** indicates the time of day (day/night).
- **Sunlight intensity** represents natural illumination.
- **Cloud cover** is shown as a layer over the sunlight intensity graph.
- **Precipitation** is visualized as an intensity graph.
- **Additional graphs** (such as temperature, relative wind speed, humidity, comfort level, etc.) are overlaid on the base layers.

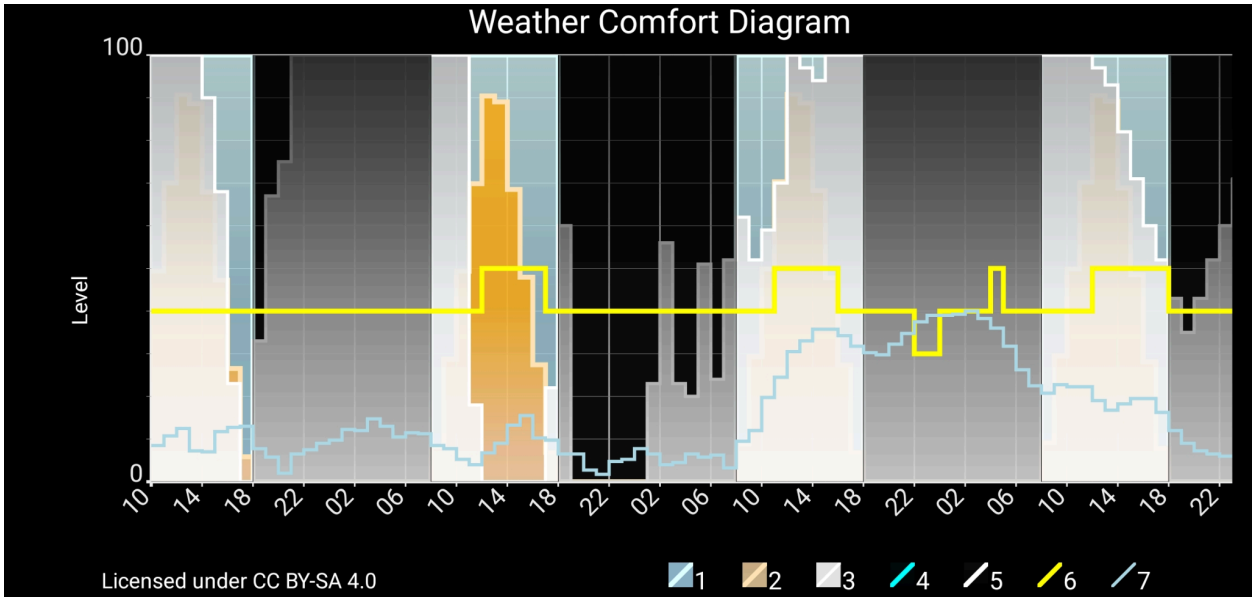
All values on the diagram are **relative** and have **arbitrary computed values**, tailored for specific tasks to provide an approximate assessment of weather conditions.

For example, in the diagram below:

- **Cloud layers** correspond to the actual percentage of cloud coverage.
- **Sunlight intensity** is a computed value based on an arbitrary algorithm that depends on the time of day.
- **The yellow graph represents the comfort level**, calculated using weather parameters based on a specific algorithm relevant to the current application context.

Comfort level is calculated arbitrarily using algorithms suitable for the current use case.

This approach allows users to **quickly assess weather conditions** without the need for complex numerical data analysis.



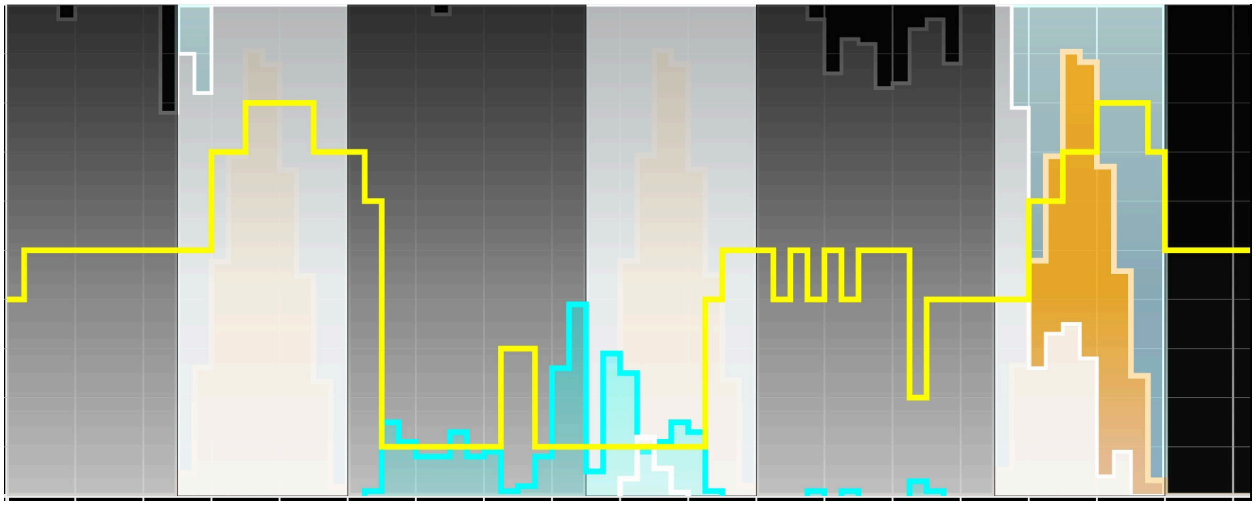
Example (Figure 1)

This example is taken from a mobile application. It includes:

- **The Y-axis** represents relative values converted into percentage units.
- **The X-axis** is a time scale.

On the diagram:

- **The black background** represents nighttime.
- **1** - Daytime.
- **2** - Sunlight intensity.
- **3** - Total cloud cover.
- **4** - Rain.
- **5** - Snow.
- **6** - Comfort level (scaled from 1 to 10).
- **7** - Relative wind intensity (in this example, the maximum wind value on the diagram corresponds to 40 km/h).



Example Diagram (Figure 2)

The provided example (Figure 2) illustrates a **weather forecast for the next three days**.

- **Tomorrow will be a good day**, although there will be no sunshine as cloud cover will reach **100%** for most of the day.
- **The following night, light rain** is expected, which will continue throughout the night and intensify in the morning.
- **The next day will bring a mix of rain and snow**, resulting in unfavorable weather conditions.
- However, after that, **a beautiful sunny day will follow**, providing excellent conditions for training and other **outdoor activities**.

In this example, numerical values on both axes are **intentionally omitted** to demonstrate that the diagram remains **readable without them**.

Applications and Prospects

WeaCoDi is suitable for use in various fields, particularly:

- **On mobile devices and gadgets** with limited screen space.
- **In web applications**, where quick weather condition assessments are required **without reading numerical or textual data**.
- **As an effective Human-Computer Interface**, simplifying the perception of weather forecasts.

The flexibility of customization makes WeaCoDi **a universal tool adaptable to different requirements**.

Conclusion

WeaCoDi introduces **a new approach to weather visualization**, optimized for **human perception**.

Layered data representation makes the diagram **intuitive and easy to interpret**.

Thanks to its **flexibility and customization capabilities**, this method can be used for both **everyday weather forecasting** and **specialized applications**.
